

To: Spence, Sandra[Spence.Sandra@epa.gov]
Cc: Myers, Craig[Myers.Craig@epa.gov]; Hermann, Karl[Hermann.Karl@epa.gov]; Ostrander, David[Ostrander.David@epa.gov]; Williams, Laura[williams.laura@epa.gov]; Wharton, Steve[Wharton.Steve@epa.gov]; Laidlaw, Tina[Laidlaw.Tina@epa.gov]; Wall, Dan[wall.dan@epa.gov]
From: Pierce, Maggie
Sent: Tue 8/18/2015 1:28:37 PM
Subject: RE: Water quality support for Gold King

While the metals strike me as a more likely cause of the greenish color, blasting residuals could be a nitrogen source to support algae. Getting the nitrogen species from the mine water could help.

I don't know if we would expect them to persist beyond a "first flush" of the mine or not.

Karl and I are digging into the information we have to see what nutrient data are available.

-----Original Message-----

From: Spence, Sandra
Sent: Monday, August 17, 2015 7:04 PM
To: Spence, Sandra
Cc: Myers, Craig; Hermann, Karl; Pierce, Maggie; Ostrander, David; Williams, Laura; Wharton, Steve; Laidlaw, Tina; Wall, Dan
Subject: Re: Water quality support for Gold King

You could test for ferrous sulfate to determine if the green color is iron related. Measure dissolved iron and sulfate.

Sent from my iPhone

> On Aug 17, 2015, at 5:30 PM, Spence, Sandra <Spence.Sandra@epa.gov> wrote:

>

> Hi Craig, you can work with Karl Hermann, Maggie Pierce, and me in my group to start with. We have historic nutrient data from those locations that we can take a look and let you know if there are total phosphorus (TP) and total nitrogen (TN) levels that would suggest the potential for algal growth. We'll take a look tomorrow. You could take additional samples for TP, TN, possibly chlorophyll A to confirm an algae problem - or look at samples under the microscope to see if algae are present in the water column. Is the water a turbid green and/or are algae growing on the benthos?

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> To me it doesn't seem likely you would be having a nutrient issue in these headwaters streams that would lead to an algae bloom, but I could be wrong. Most sources of nutrients include sewage treatment plants/septic tanks/cattle manure, etc. Would you expect any of those sources in the vicinity of the locations you mention?

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> Alternatively, some metals including copper and iron (for example Fe+2) have oxidation states that make them appear green/blue green. So, if you have low dissolved oxygen water (low redox state) entering the streams (maybe as groundwater), you could have reduced metals in solution. Do you know the dissolved oxygen and pH readings in the green areas? Anyway, we'll take a look at the historic data trends in dissolved oxygen, pH, iron, and copper as well.

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> -----Original Message-----

> From: Myers, Craig
> Sent: Monday, August 17, 2015 2:47 PM
> To: Spence, Sandra
> Cc: Ostrander, David; Williams, Laura
> Subject: Water quality support for Gold King

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> David Ostrander suggested that I reach out to you. I need some expertise/support on water quality. The

river is a shade of green, and appears to be green in all smaller headwaters streams (mineral, cement creeks, and the upper animas) above the portions of the animas effected by the discharge. We think it is at least partially due to algae and not due to actions at the mine, but are getting pressure from the community to understand the phenomenon. I would greatly appreciate knowing who to discuss this with on your staff. Thank you.

>

> Craig Myers

> Federal On-Scene Coordinator

> Incident Commander

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> Sent from my iPhone